Power Xpert Architecture
Power quality and energy meters

Power Xpert Meters 4000/6000/8000

EATON
Powering Business Worldwide

City Electric

Power Xpert Meters 4000/6000/8000

Power quality and energy meter

You can't manage what you can't measure, and you certainly can't measure something you can't even see—without a power quality instrument, that is. Invisible and fleeting power disturbances can be silent killers—the electronic equivalent of high blood pressure.

Eaton's Power Xpert® Meters 4000/6000/8000 provide comprehensive, world-class power measurement and monitoring that reduce day-to-day operating costs and help avoid costly business interruptions.

EC&M Product of the year 07 Category Winner

2007 FROST & SULLIVAN
North American Power Quality Emerging Technology of the Year Award

Power Xpert Meters 4000/6000/8000

Power quality and energy monitoring and management is now as easy as surfing to it with your Web browser, or you can "Twist-and-Click" on the LCD display!

1. **Communications LED**
2. **Events LED**
3. **320 x 240 pixel backlit LCD graphic display**
4. **Ethernet RJ45 configuration port**
5. **Navigation control dial**
6. **Back-button**

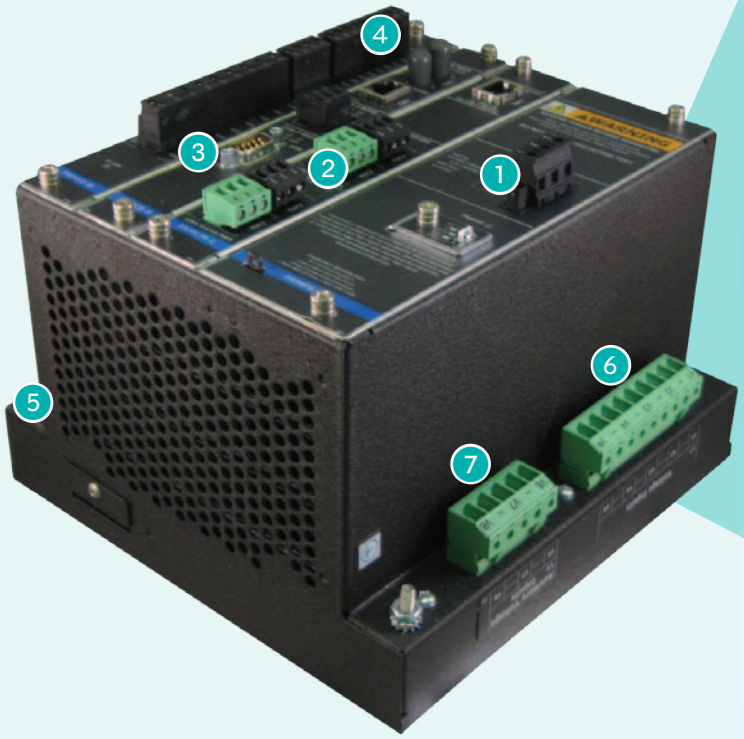
Display measurements

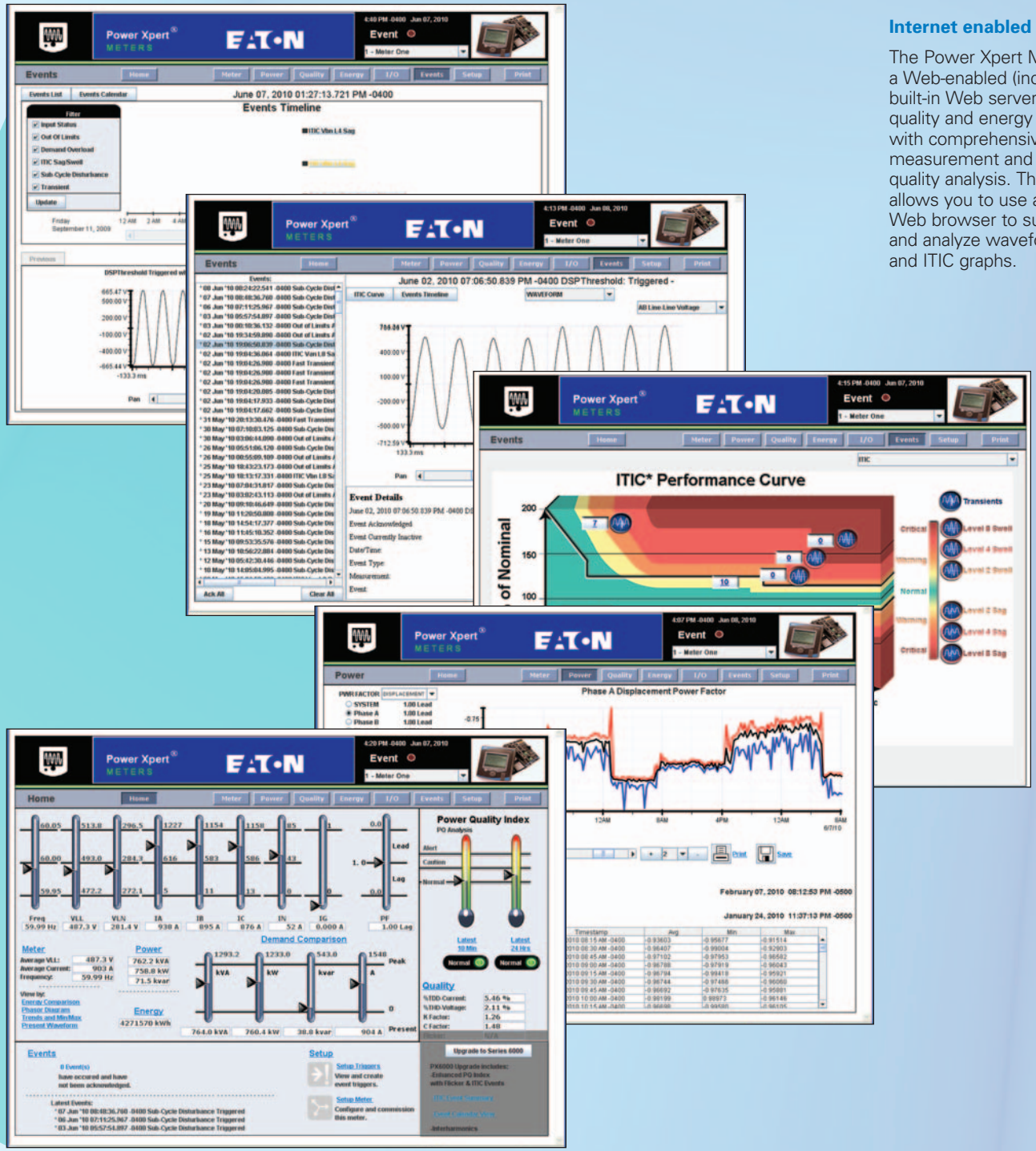
- Height: 9.00 inches (228.6 mm)
- Width: 7.80 inches (198.1 mm)
- Depth: 2.00 inches (50.8 mm)
- Shipping weight: 2.1 lbs. (0.95 kg)

1. **Control power input**
2. **Configuration, display and Modbus® card**
3. **Communication expansion card**
   - 100F and 10/100Base-T Ethernet
   - Modbus TCP
   - Web server communications
   - E-mail on alarm, periodic data e-mail
   - NTP time synchronization
   - RS-485 Modbus RTU port
   - RS-232 Modbus ASCII port
4. **Digital I/O card**
   - 8 digital inputs
   - 2 solid-state outputs
   - 3 relay outputs
5. **Current transformer terminal**
6. **Voltage terminal**
7. **Auxiliary voltage terminal**

Meter module measurements

- Height: 8.88 inches (225.6 mm)
- Width: 9.56 inches (242.8 mm)
- Depth: 6.72 inches (with connectors, 170.8 mm)
- Shipping weight: 7.1 lbs. (3.22 kg)





Internet enabled

The Power Xpert Meter is a Web-enabled (includes a built-in Web server) power quality and energy meter with comprehensive power measurement and integrated quality analysis. The meter allows you to use a standard Web browser to surf the meter and analyze waveforms, trend and ITIC graphs.

Power Xpert Meters 4000/6000/8000

Innovative. Intuitive. Accurate. Accessible.

The meters combine state-of-the-art technology with ITIC diagnostics, waveform capture, data trending and performance benchmarking, along with a "Twist-and-Click" graphic display: a new paradigm for simplicity and ease of use in the marketplace. The embedded Web server enables users to surf to the meter over the Internet via a standard Web browser. The new platform offers advanced functionality like high-speed impulsive transient capture, 6 MHz sampling rate (100,000 samples per cycle), anti-aliasing, ITIC analysis and automatic trigger setting, field-upgradeable firmware, memory up to 8 GB, and optional digital, relay and solid-state I/O.

Applications

Identify power quality problems to help

- Identify harmonics, sags, swells and transients damaging or disrupting sensitive, mission-critical IT equipment
- Boost IT equipment service life to the maximum
- Analyze sequence of events up to one millisecond time resolution
- Protect motors from damage
- Preserve the integrity of processes and batches
- Prevent blown capacitor bank fuses
- Protect transformers and conductors from overheating

Detect and record high-speed transients to help

- Avoid equipment damage and disruption
- Identify equipment malfunction

Monitor circuit loading to help

- Avoid overloads and nuisance overload trips
- Maximize equipment utilization
- Manage emergency overloads

Manage energy utilization to help

- Reduce peak demand charges and power factor penalties
- Identify excessive energy consumption

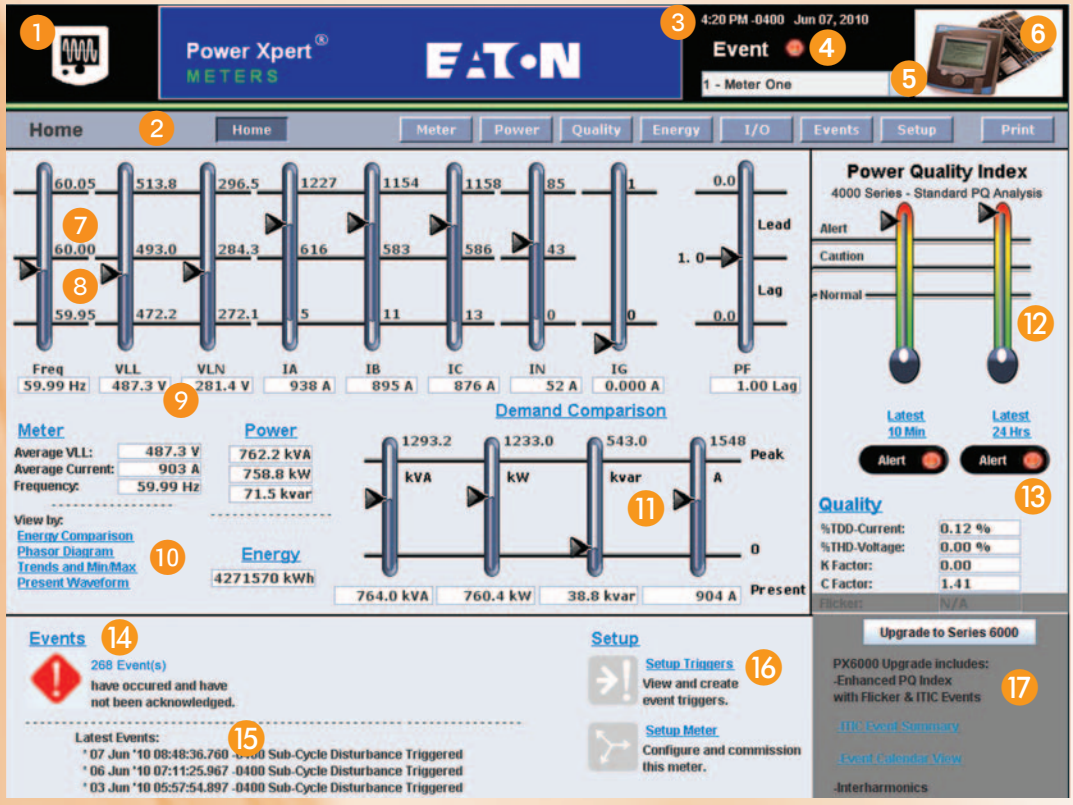
Features and benefits

- Embedded Web server—see and analyze waveforms, trends and harmonics directly in your Web browser or LCD meter graphic display
- Automatic power quality analysis and trigger setting with available ITIC performance curve: detect and capture sags, swells, transients, harmonics and flicker
- Accurately detect fast transients that previous generation monitors would miss, by assessing circuit activity at very high sampling rates (up to 100,000 samples per cycle)
- Comprehensive power, energy and demand measurements for 145 standard data points logged
  - Voltage, current: per phase minimum, maximum, average, trend graph analysis, export, print
  - Power: power factor, apparent, real, reactive, frequency
  - Energy, demand: forward, reverse, net, sum, TOU, profile, previous month comparison, graph analysis, export, print
- Up to one millisecond time synchronization and event logging capability for sequence of events analysis
- Get an at-a-glance view of power quality with patented Power Quality Index gauge, statistically derived trending and red-yellow-green indicators for overall power health
- Support continuous, non-disruptive monitoring with a permanently installed meter
- Dramatically reduce the cost of monitoring power quality, compared to yesterday's specialized power quality instruments and consultants
- Alarm notifications are also available remotely via e-mail with waveform attached, with expansion communication card
- Use industry-standard communication protocols to support a multitude of configurations and third-party software: HTTP, FTP, Modbus RTU, Modbus TCP, SNMP, SMTP, NTP, COMTRADE
- Up to 8 GB data storage capability
- Supported via Power Xpert Software and Power Xpert Architecture hardware components
- ANSI C12.20 accuracy

Home page

The Power Xpert Meter home page—Innovative. Intuitive. Accurate. Accessible.

The Power Xpert Meter home page, viewed in a standard Web browser, summarizes the top-level critical power quality information on a single page. Complex power quality data is presented in useful and simple graphical charts and gauges.



1. Power Xpert device type icon
2. 3D function button bar
3. Time stamp
4. Event LED
5. Drop-down menu for meter selection
6. Picture of device or graphic of choice
7. 3D "mercury-filled" voltage, current, frequency, power factor gauges
8. 3D arrowhead pointing to present value
9. Measurement parameters
10. Underlined Web links
11. Demand profile chart
12. 3D PQ health index thermometer gauge
13. 3D LEDs for PQ temperature
14. Active, unacknowledged events
15. One millisecond time stamping resolution
16. Quick links to meter setup
17. Button to upgrade to the Power Xpert Meter 6000

Easily upgrade your Power Xpert Meter 4000

Eaton understands that our customers' needs change over time. That's why we've developed meters that can grow with you. Once a Power Xpert Meter 4000 is purchased, you have the ability to upgrade to a Power Xpert Meter 6000.

Once upgraded, the Power Xpert Meter 4000 will have all its original features, plus all of the Power Xpert Meter 6000 capabilities.❶ The added capabilities include:

- **The Power Quality Index Enhanced Version**
  View a quick display of the "temperature" of your power quality; includes standard index plus sag level, swell level and flicker
- **Interharmonics**
  See the effects of loads that are not multiples of 60 Hz
- **ITIC performance curve**
  See how much (or how little) voltage your IT equipment can sustain without damage, over what length of time
- **Events Calendar view**
  View the frequency of power events and gain insight that helps detect reoccurring problems
- **Events Timeline view**
  View and understand the sequence of events that have occurred during a period of time

❶ The upgraded Power Xpert Meter 4000 will retain its 2 GB memory capacity.

Power Xpert Meters 4000/6000/8000

Three flavors of power monitoring

The Power Xpert Meter 4000

This meter provides all the core functions for monitoring power consumption and power quality along with 2 GB of data storage. This unit uses Delta Sigma technology to sample circuits at 4,096 samples per cycle for extremely accurate measurement of power factor and energy consumption.

The Power Xpert Meter 6000

This meter is geared toward the IT market by providing automatic trigger settings for IT equipment and plots events on an ITIC (Information Technology Industry Council) performance curve so they can be very easily analyzed. In addition, this meter offers a patented Power Quality Index temperature gauge along with flicker calculations and 4 GB of data storage.

The Power Xpert Meter 8000

This meter adds the ability to capture very fast transients by sampling at 6 MHz—100,000 samples per cycle. That's a sample every 166 nanoseconds—six samples every millionth of a second, across three input channels as well as neutral-to-ground. In addition, the meter has a capacity of 8 GB for data storage.

Features and benefits of the Power Xpert Meters 4000/6000/8000

	Power Xpert Meter			
Feature	**4000**	**6000**	**8000**	**Benefit**
General				
Embedded Web server	■	■	■	Use a standard Web browser to monitor and manage the meter over the network, Internet
TOU metering support	■	■	■	Time of usage can be set up to support 4 different schedules
Firmware flash upgrade support	■	■	■	Enables you to flash the meter with the latest firmware upgrades
Self-learning capability (characterizes "normal" per circuit)	■	■	■	The meter can automatically adjust to the environment and alarm only when "real" events occur
Power, Energy and Demand				
Voltage, current: per phase minimum, maximum, average, trend graph analysis, export, print	■	■	■	Review voltage and current trends, export, print and analyze parameters right on the meter or external software
Energy and demand plot comparisons month-to-month, week-to-week	■	■	■	Plot two months or two weeks for vivid energy or demand comparison
Power: power factor, apparent, real, reactive, frequency	■	■	■	Review power usage and power factor and avoid potential PF penalties
Energy, demand: forward, reverse, net, sum, TOU, profile, previous month comparison, graph analysis, export, print	■	■	■	Keep track of your energy usage, compare time of usage and usage against previous month, identify peaks to conserve energy usage
Power Quality Analysis				
Statistical analysis (min., max., average)	■	■	■	Review statistical trends, identify past and future problem areas
Sag and swell monitoring, management and recording	■	■	■	Capture electrical sags and swells and analyze the waveforms
Symmetrical components: zero, negative, positive	■	■	■	Analyze possibly unbalanced three-phase power systems
Low frequency transient detection and capture	■	■	■	Capture lower frequency transient waveforms for retrospective analysis or e-mailing
Sampling rate, maximum samples/cycle	4096❶	4096❶	100,000	Extremely high sampling rate will effectively capture impulsive transients
"Number of nines" uptime data (e.g., 6 nines = 99.9999%)	■	■	■	Review uptime availability percent
K-factor	■	■	■	Review the ratio of eddy current losses, e.g., when driving non-linear and linear loads
Crest factor	■	■	■	Review the peak-to-average ratio of the waveform
Security				
Secure 5 level user access privileges	■	■	■	Define appropriate security access level per user

❶ Delta Sigma A/D oversampling rate.

NOTE: These specifications are subject to change without notice and represent the maximum capabilities of the product with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options and product model. Please refer to the technical data sheet and User Manual for detailed specifications.

Features and benefits of the Power Xpert Meters 4000/6000/8000, continued

	Power Xpert Meter			
Feature	**4000**	**6000**	**8000**	**Benefit**
Communications and I/O				
Modbus TCP	■	■	■	Easy integration with standard protocol to power management and other software
Modbus RTU	■	■	■	Integrate meters to existing Modbus networks, daisy chain several (1–16) meters together
HTML	■	■	■	Communicate to the meter over the Internet via standard Web browser
SNMP (Simple Network Management Protocol)	■	■	■	Communicate with the meter via Simple Network Management Protocol; hook to existing Network Management system
SMTP (Simple Mail Transfer Protocol)	■	■	■	Send e-mail messages via standard Simple Mail Transfer Protocol
FTP (File Transfer Protocol)	■	■	■	Access, copy, paste, cut waveform capture files on the meter with an FTP Client
NTP (Network Time Protocol)	■	■	■	Network Time Protocol support enables the meter to synchronize time over the network up to the 1 millisecond resolution
COMTRADE, open IEEE® standard file format for	■	■	■	Import waveform captures in standard IEEE (C37.111-1999) COMTRADE file format to waveform capture export
Trend measurements CSV file export	■	■	■	Easily export trend measurements to third-party applications, e.g., Microsoft® Excel® in standard CSV file format
I/O (8 digital inputs, 3 relay outputs, 2 solid-state KYZ outputs)	■	■	■	The Power Xpert I/O Card is extremely flexible and can be used in a large variety of different applications. Digital inputs and relay outputs can be programmed to interact during various conditions defined by the user. Various third-party devices, such as alarm, pulse meters, trip units and sensors, can be easily integrated into the Power Xpert Meter. Triggers and events can be tied to the meter's standard functions, such as e-mail, logs and trends
Time Synchronization				
NTP time synchronization up to 1 millisecond accuracy	■	■	■	Network Time Protocol support enables the meter to synchronize time over the network up to the 1 millisecond resolution
GPS time synchronization up to 1 millisecond accuracy	■❷	■❷	■❷	Allows the meter to synchronize time over the GPS satellite positioning system up to the 1 millisecond resolution
Logs				
Trend logging	■	■	■	Log trend information for easy statistical analysis
Load profile	■	■	■	Review the load profile graph to get a better understanding of your electrical load versus time
Event logging	■	■	■	Log events for retrospective event analysis
Memory and Storage				
Standard memory, GB	2	4	8	Store large amounts of waveform captures and events for historical analysis

❷ When used with third-party device and I/O option.

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Features and benefits of the Power Xpert Meters 4000/6000/8000, continued

Feature	Power Xpert Meter 4000	6000	8000	Benefit
Harmonics				
Harmonic levels	127	127	127	Provides extremely fast, high resolution D/A conversion
Total Harmonic Distortion (THD)	■	■	■	Review the total harmonic distortion level directly on the meter
Delta-Sigma D/A conversion technology	■	■	■	Provides extremely fast, high resolution D/A conversion
Harmonics over-sampling (4096 samples per cycle)	■	■	■	Over-sampling enables the usage of anti-aliasing technology, increasing accuracy
Anti-alias filtering	■	■	■	Technology to remove out-of-band signal components resulting in more accurate data
Individual harmonics	■	■	■	Review individual harmonic levels directly on the meter
Total Demand Distortion (TDD)	■	■	■	Identify harmful harmonics in, e.g., lightly loaded variable-speed drive environments where THD may be high but not relative
Interharmonics	—	■	■	Interharmonics allow you to see what is going on between the integer multiples of the fundamental. View every 5 Hz instead of every 60 Hz
Highlights				
Sub-cycle disturbance capturing	■	■	■	Capture fast voltage changes/low frequency transient (e.g., capacitor switching transient)
dV/dt triggers for sub-cycle oscillatory transients	■	■	■	Detect and record a large magnitude oscillation transient resulting in equipment damage
Absolute threshold and dV/dt triggering	■	■	■	Detect and record if a surge suppressor is necessary
Power Quality Index—Standard (includes dV/dt count, %TDDi and %THDv)	■	■	■	Complex power quality data put into simple graphic format
Power Quality Index—Enhanced (includes Standard Index plus Sag level, Swell level and Flicker)	—	■	■	Complex power quality data put into simple graphic format (includes ITIC events and flicker calculations)
Flicker calculations	—	■	■	Detect and quantify low frequency rms voltage variations causing incandescent lighting flicker
Automatic trigger setting	—	■	■	Trigger thresholds are automatically set according to ITIC (CBEMA) standard, no need to figure this out by yourself
Automatic event severity analysis	—	■	■	Automatically analyze the severity of the event with the ITIC (CBEMA) performance curve plot, see where the event actually hit
Event severity counters	—	■	■	An ITIC (CBEMA) event counter keeps track of the number of all sags, swells and transients
ITIC (Information Technology Industry Council), previously CBEMA performance curve	—	■	■	ITIC (Information Technology Industry Council), previously CBEMA performance curve for easy power problem evaluation
Custom ITIC (CBEMA) plot with individual event magnitude and duration	—	■	■	Review custom ITIC (CBEMA) plots of individual events showing you the actual and hit are in a simple graphical representation
Events Calendar view	—	■	■	The Events Timeline calendar view provides instant insight to the frequency of power events and helps detect reoccurring problems
Events Timeline view	—	■	■	View and understand the sequence of events that have occurred during a period of time
Sequence of events and events plot on waveform	—	■	■	Plot color-coded events on a captured waveform to gain insight into the sequence of events cycle per cycle
Power Quality Index—Premium (includes Enhanced Index plus counts of impulsive transients)	—	—	■	Complex power quality data put into simple graphic format (includes ITIC events and flicker calculations)
High-speed transient capture and detection				
6 MHz capture of impulsive transients	—	—	■	Capture impulsive transients by taking 6 samples every millionth of a second
Transient capture duration: ~20 ms/6 MHz ~120 ms/1 MHz	—	—	■	Record and analyze transients during a longer time frame
Waveform recorded at 100,000 samples per cycle	—	—	■	High speed ensures impulsive transients are correctly captured (fast rise time)
Three-phase voltage and neutral-to-ground fast transient capture	—	—	■	Capture impulsive transients on all four channels

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Power Xpert Meters 4000/6000/8000

A world of difference in power quality analysis

One millisecond time resolution—most accurate time available

Harmonics, voltage fluctuations, transient overvoltage conditions and other power anomalies can wreak havoc on your equipment and processes. It is essential to fully understand the quality of the power that is being delivered throughout the facility. Detailed event information makes it possible to pinpoint the root causes of problems—or prevent them from occurring. With up to one millisecond time stamping accuracy supported via GPS and IRIG-B time references when used with third-party device and I/O option, Power Xpert Meters register the sequence of events in a time synchronized environment. Based on National Institute of Standards and Technology (NIST) atomic time, you can count on the most accurate time available. In the past, basic power monitors were used to identify existing conditions on an electrical distribution system or to evaluate past problems. If you wanted to detect fast voltage transients, you had to bring in expensive, portable power quality monitors that usually required an outside consultant.

Built-in graphing—up to six samples every millionth of a second

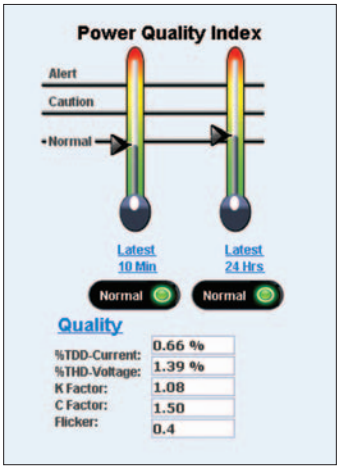
Power Xpert Meters 4000/6000/8000 redefine the art of measuring and monitoring power quality. Thanks to the latest technologies, these metering instruments are able to measure, trend, analyze and capture waveforms while serving Web pages to users over the Internet, along with simultaneous FTP downloading and comma-separated values (CSV) exporting capabilities. No matter whether you are a PhD-level power quality engineer or an IT system administrator, these instruments will provide you with the level of information you need, in an easy-to-understand graphical user interface at astonishing speeds of up to six samples every millionth of a second, if necessary.

Easy-to-use interface—demystifies power quality

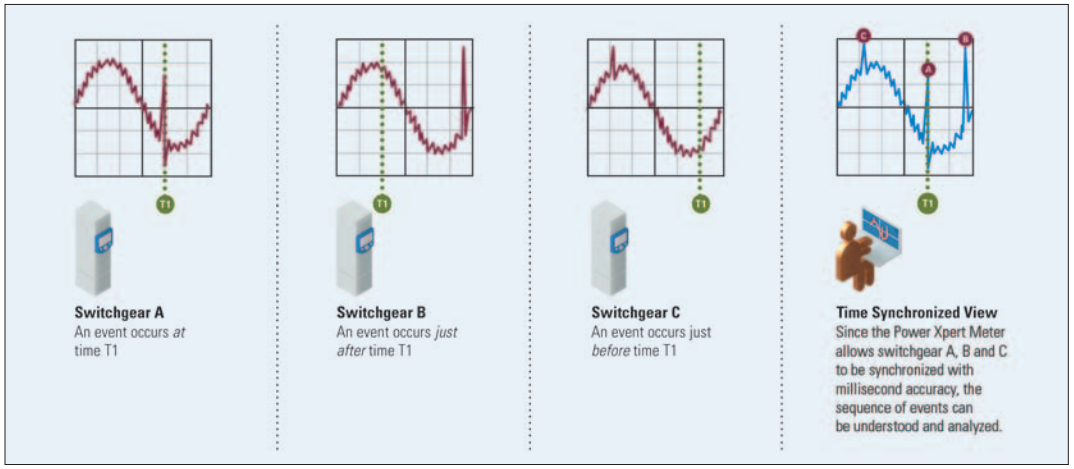
In designing these power quality instruments, Eaton set out to demystify power quality—to take highly specialized data and convert it into useful information that doesn't require a power guru or consultant to understand. The result is an uncommonly easy-to-use interface and graphical analysis of complex power quality data—delivered via e-mail, over the Web and to third-party applications. With these capabilities, your power team can predict and prevent power quality problems before they lead to equipment malfunction, overheated circuits and system failure.

Multiple gigabyte storage capability—store and trend 10–25 years' worth of data

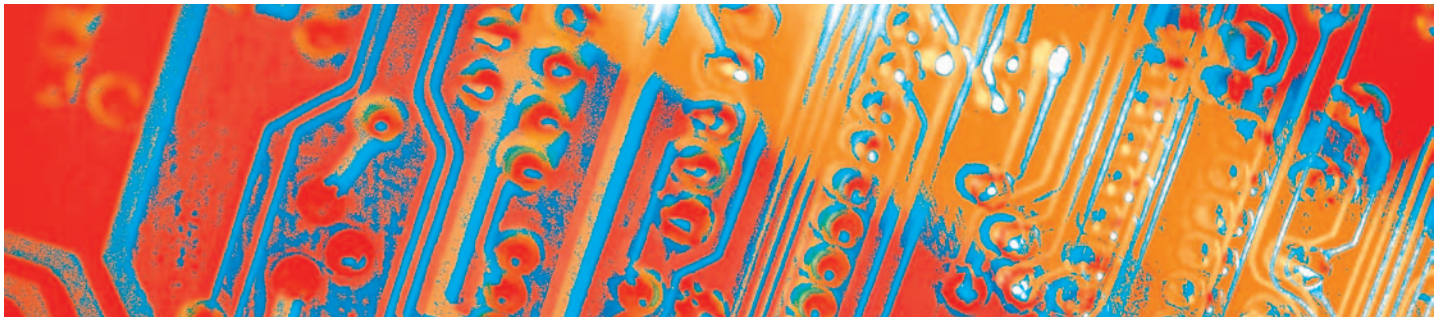
Having enough storage capacity is a critical factor at this level of power quality instrumentation. How long can I store data locally on the power quality meter before the system will have to start overwriting previously captured information? A Power Xpert Meter 4000 provides 2 GB of storage; the 6000, 4 GB; and the 8000, 8 GB. In a typical power quality environment this would provide storage capability for 10–25 years depending on the meter model.



Power Quality Index
The patented Power Quality Index measures the "temperature" of your power quality. The gauges' alarm levels are based on current TDD%, voltage THD%, and K and C factors. Flicker and ITIC events measurements are also factored in on the 6000 and 8000 models.


T1
Switchgear A
An event occurs at time T1
Switchgear B
An event occurs just after time T1
Switchgear C
An event occurs just before time T1
Time Synchronized View
Since the Power Xpert Meter allows switchgear A, B and C to be synchronized with millisecond accuracy, the sequence of events can be understood and analyzed.

One Millisecond Time Resolution
Accuracy: By taking readings at sub-cycle levels—like the Power Xpert Meter 8000 model, which can sample at a rate of 166.67 nanoseconds per sample—Power Xpert Meters let you accurately see the detailed performance of each piece of gear they are connected to.
Time: To understand the cause and effect of events, you need to be able to analyze the interaction of equipment and the sequence of events. This requires accurate time synchronization across the system.



Power Xpert Meters' 4000/6000/8000 estimated memory and storage capacity with 2/4/8 GB memory capacity

				Occurrence per Month ❶		Memory Usage (MB)		Months of Capacity ❷	
Model	**Memory**	**Event**	**File Size (KB)**	**Typical**	**Severe**	**Typical**	**Severe**	**Typical**	**Severe**
PXM4000	2 GB	Subcycle Disturbance	1260	10	60	12.3	73.8	166	28
PXM6000	4 GB	ITIC Event	1260	5	20	6.2	24.6	666	166
		Subcycle Disturbance	1260	10	60	12.3	73.8	333	55
		ITIC + Subcycle Disturbance Combined	Total →	15	80	18.5	98.4	222	42
PXM8000	8 GB	ITIC Event	1260	5	20	6.2	24.6	1332	333
		Subcycle Disturbance	1260	10	60	12.3	73.8	666	111
		Transients	2048	3	30	6.0	60.0	1365	137
		ITIC + Subcycle Disturbance + Transients	Total →	18	110	24.5	158.4	335	52

❶ The typical and severe power quality event occurrences are estimates and may vary depending on the electrical environment.

❷ Memory is not allocated by event category; memory is used first come, first served.

Built-in ITIC performance curve analysis

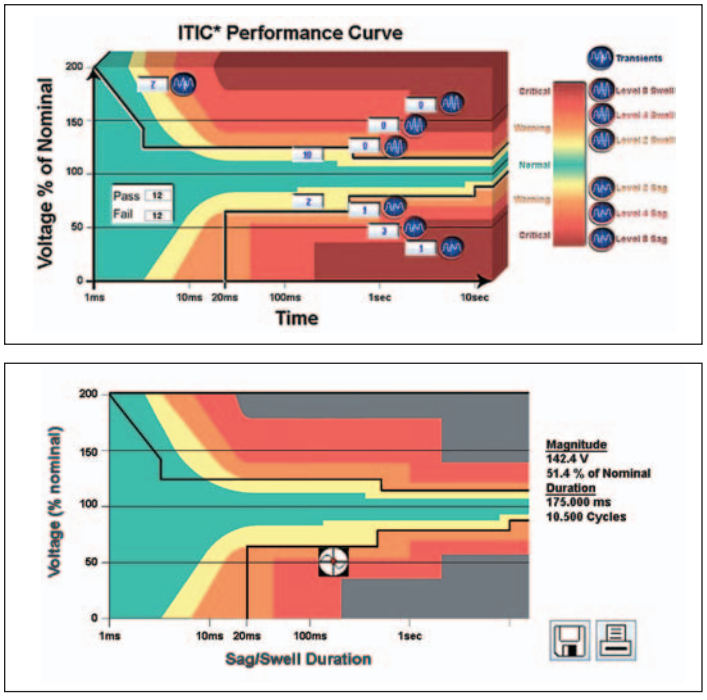
Takes the guesswork out of understanding the severity of IT Power Quality events

The ITIC (Information Technology Industry Council) curve describes how much (or how little) voltage your IT equipment can sustain without damage, over what length of time (nanoseconds to seconds). When you can plot power events in this broader context—relative to multiple variables—you can identify trouble that could cause damage or may be brewing. Of the few meters that can plot events on an ITIC curve, most require special software to do it. Eaton's Power Xpert Meters 4000/6000/8000 require no special software. Out of the box, these meters provide crisp graphics on minimum, maximum, average trends, measurement gauges, waveforms both on the local LCD display and the Web interface.

ITIC curves

The Power Xpert Meter 6000 and 8000 models automatically plot events on the ITIC curve. The user can drill down on any specific event and get information on where exactly the event hit and what was its magnitude and duration. Using a network time server, all events get time stamped at a 1 millisecond synchronized resolution.

The ITIC Web page includes counters to track the occurrence of disturbances and a pass/fail summary. In addition, selecting any disturbance counter links to a detailed event view of the disturbances in that ITIC category. Disturbance waveforms can be viewed from the browser.



ITIC Curves
Sample ITIC curve as displayed by the Power Xpert Meter

Power Xpert Meters 4000/6000/8000

Access the meter through the Internet/Ethernet via embedded Web server

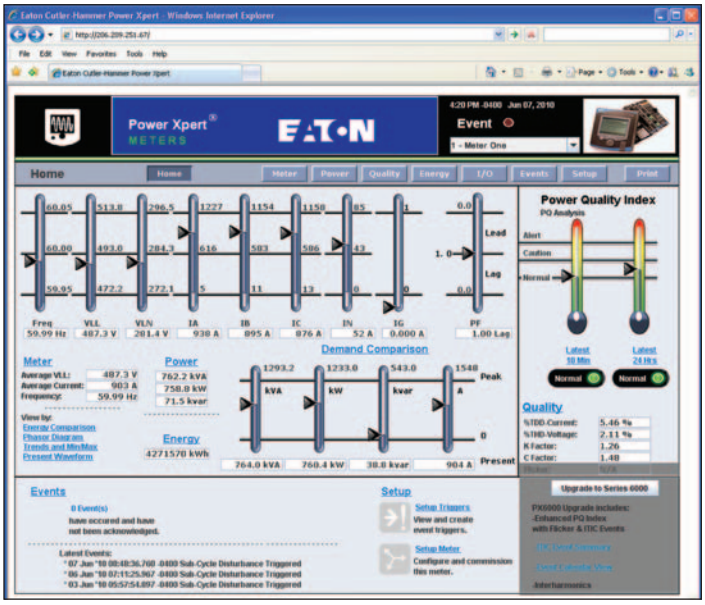
Power Xpert Meters 4000/6000/8000 offers Eaton customers a new level of accessibility to the critical information required to manage the electrical distribution system. The meter's embedded Web server includes real-time circuit information in both numeric and graphical visual formats to help monitor circuit parameters, such as current loading, voltage and power levels and power factor.

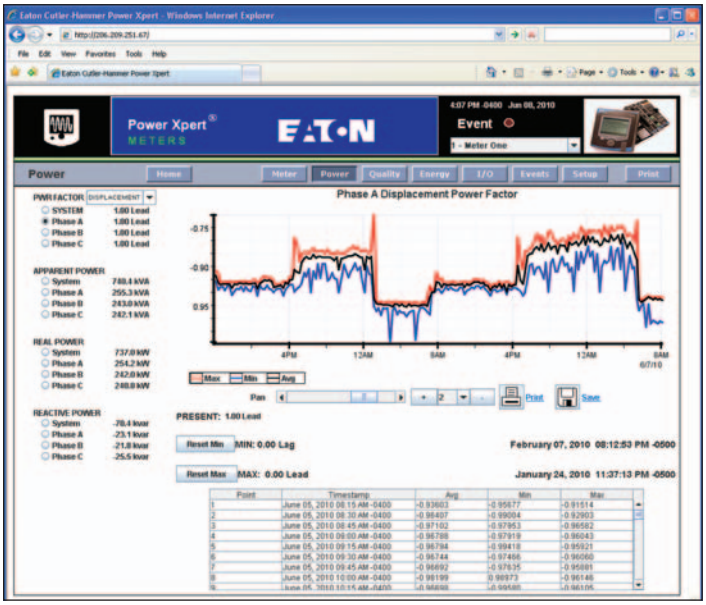
Power Xpert Meters 4000/6000/8000 home page

The Web server also provides the energy and demand readings required to help manage the cost of energy. Readings include KWh, KVARh, delivered and received and KVAh with time of use and separate status input controlled energy accumulation to account for energy during special times, such as rate alert periods or stand-by generator times of operation. The Web server on the Power Xpert Meters also includes critical information regarding power quality, such as harmonic distortion, flicker, crest factor, K-factor and more.

Historical trend plot

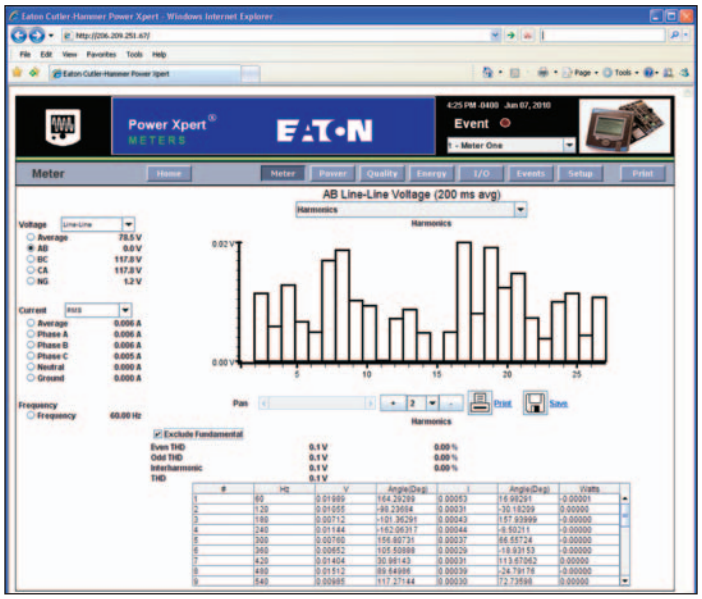
The Power Xpert Meters' 4000/6000/8000 embedded Web server supports graphical trend charts of key circuit measurements, such as current, voltage, power and energy. The trend chart supports a zoom feature that allows the user to view data over a short period of 18 hours or a longer period of 48 months. The trend chart has a horizontal slider bar control to manage scrolling forward and backward through the data. Trend charts of basic readings include minimum, maximum and average readings. Trend charts of energy data also display demand values.





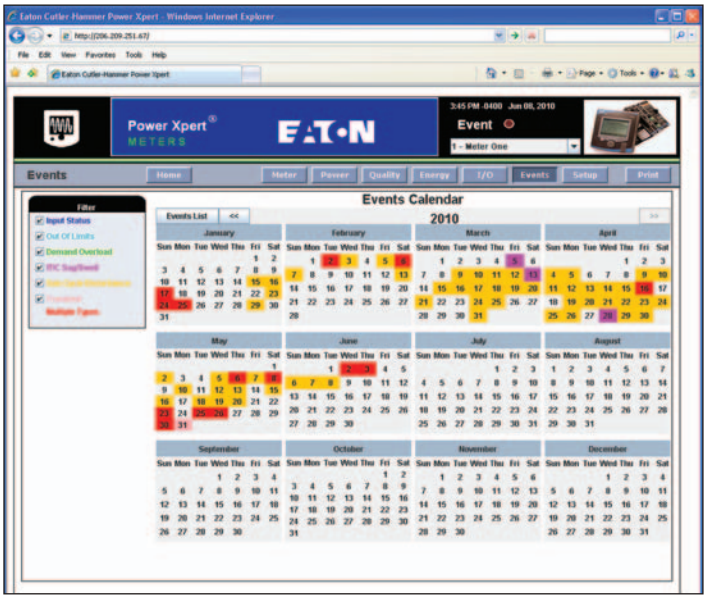
Harmonic spectral plot

The harmonic spectral plot displays both harmonics and inter-harmonics up to the 85th order. A detailed table also includes individual magnitudes and angles of current and voltage harmonics as well as a harmonic power calculation at each frequency. Even, Odd, Interharmonic and total THD are displayed for diagnostic purposes.



Events Calendar view screen

On the 6000 and 8000 models, the Events Timeline calendar view provides instant insight to the frequency of power events and helps detect reoccurring problems. Color-coded events can be filtered to detect specific issues.



Disturbance recording sag/swell recording

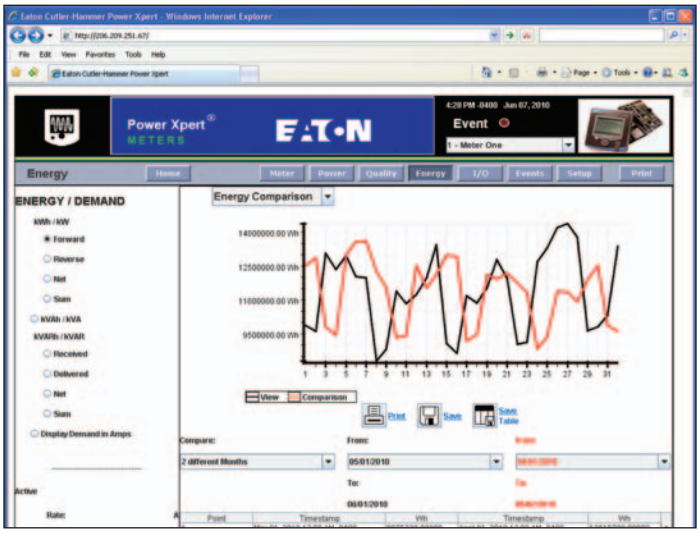
Sixty cycles of waveform are oversampled at 4096 samples (100,000 samples with the 8000 meter) per cycle, including 30 cycles of pre- and post-event data. The Power Xpert Meters' 4000/6000/8000 embedded Web server supports viewing of triggered waveforms one channel at a time, including the ability to zoom and to scroll horizontally using a slider bar. Waveforms are stored in meter's non-volatile flash memory using an industry standard Comtrade format. Waveforms can be automatically sent out by e-mail following an event, or can be retrieved from an FTP directory structure in meter's memory.

Events Timeline view screen

By clicking on a date within the Events Calendar view (available in the 6000 and 8000 models), the user can view and understand the sequence of events that have occurred during a period of time. Plot color-coded events on a captured waveform to gain insight into the sequence of events from one single cycle to the next one. This provides the user an excellent vantage point to review and compare multiple events at an unprecedented resolution.

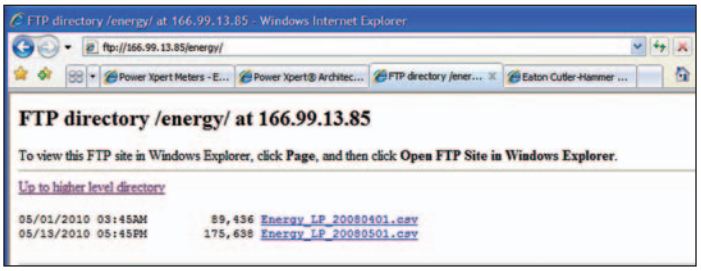
Energy usage comparison screen

Energy usage patterns can be effortlessly analyzed with the month-to-month, week-to-week comparison chart. Raw data can be easily exported with the "Save Table" option to other applications such as Excel for further analysis or graphing.

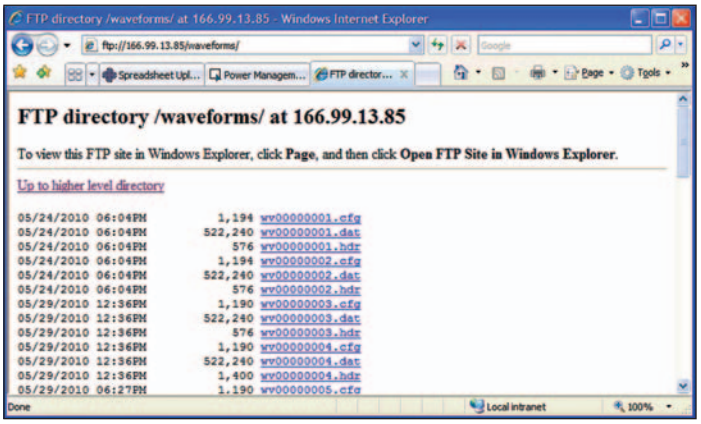


FTP energy directory

Power Xpert Meters save energy consumption measurements in monthly logs stored on the meter's FTP server. Logs can be easily read, copied or imported into third-party applications for detailed energy usage patterns analysis.


FTP directory /energy/ at 166.99.13.85
To view this FTP site in Windows Explorer, click Page, and then click Open FTP Site in Windows Explorer.
Up to higher level directory
05/01/2010 03:45AM 89,436 Energy_LP_20080401.csv
05/13/2010 05:45PM 175,638 Energy_LP_20080501.csv

Waveform captures are automatically stored on the FTP server in the IEEE standard COMTRADE file format. This allows users to view and analyze the waveforms in any standard free-of-charge or commercial COMTRADE file viewer.



Power Xpert Meters 4000/6000/8000

Configuration communication examples

The Power Xpert Meters fit seamlessly into most any existing or new environments due to standard and open protocol support. The Power Xpert Architecture allows the users to build on their existing infrastructure and the flexibility to upgrade as their needs grow going forward. Configuration of the meters is simple and easy through the Web-based graphical user interface (GUI) and/or the LCD display.

Display link (RS-485)

Up to 16 meters can be daisy-chained to a single Power Xpert Meter LCD display.

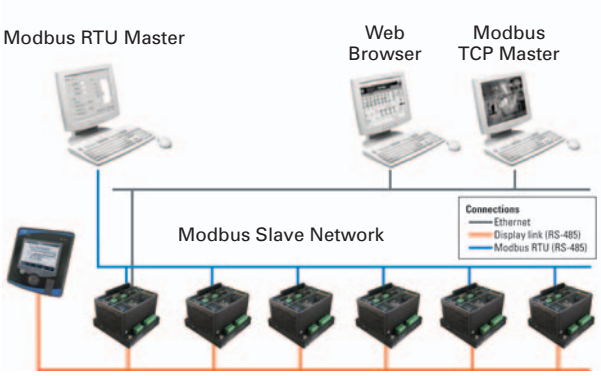
Conveniently and cost-efficiently, a single Power Xpert Meter LCD display can support up to 16 Power Xpert Meter modules. This is especially handy when several meter modules are installed in multiple rack or switchgear lineup formations.

Display Link (RS-485)

Web enabled—browser and Modbus TCP

Web browsing and Modbus TCP master connectivity have been added in this configuration example. Only one Power Xpert Meter has an Ethernet connection. All other Power Xpert Meter modules are utilizing this same connection.

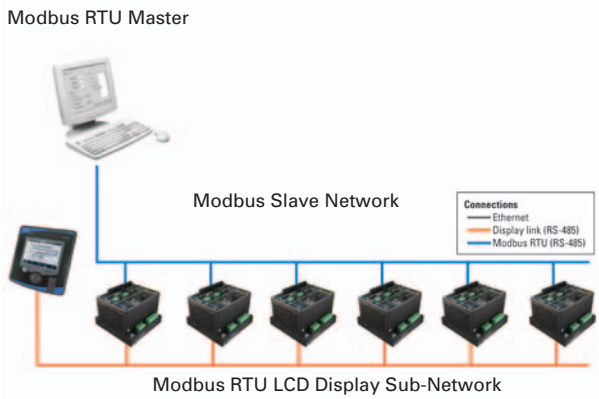
Note: Certain restrictions pertaining to waveforms, e-mail sending and other capabilities apply to the meters using the same Ethernet connection.



Modbus RTU LCD Display Sub-Network

Modbus RTU (RS-485)—non-Web enabled

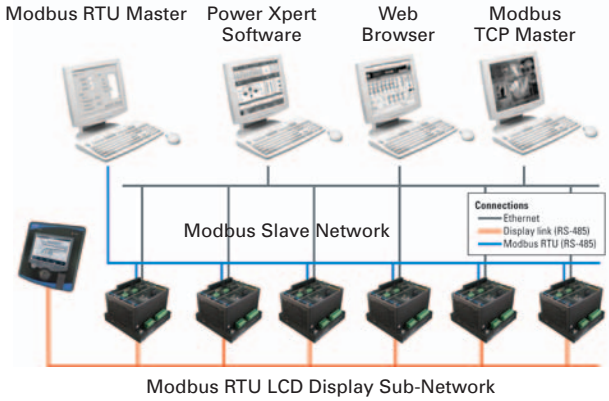
A Modbus RTU Master is supported in addition to the Power Xpert Meter LCD display sub-network. Power Xpert Meters are set up as Modbus slaves. This configuration is a cost-efficient way to connect to an existing Modbus RTU Master, e.g., a building management system (BMS).



Modbus RTU LCD Display Sub-Network

Web enabled—advanced system functionality

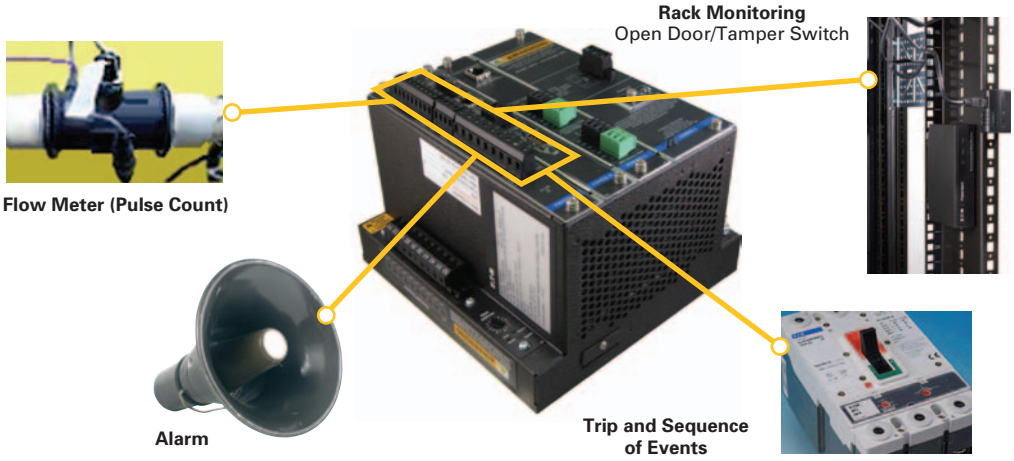
This configuration provides full Modbus RTU/TCP capabilities as well as direct Web browsing to individual meters. In addition Web services are supported to Power Xpert Software. This configuration is required for full Modbus and Power Xpert Software applications.



Modbus RTU LCD Display Sub-Network

Digital I/O card usage examples

The Digital I/O card option enables multiple sensor devices to be attached to the meter, including alarm horns, water on the floor, door open or motion detection among others. Solid-state digital outputs support KYZ pulses and the three relay outputs can be easily connected to third-party devices and controlled depending on the digital inputs (Boolean functionality support).



- Eight digital inputs
- Two solid-state digital outputs
- Three relay outputs

To find out more about how Power Xpert Meters can improve power performance for your critical systems, visit our Web site at www.eaton.com/powerxpert or contact us at 1-877-ETN-CARE (1-877-386-2273).

Power Xpert Meter 4000/6000/8000

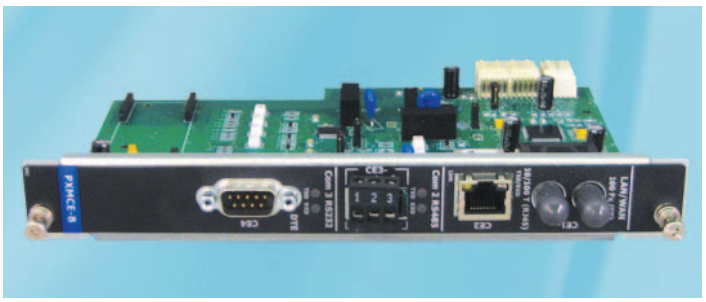
Available accessories

Graphic display module

The graphic display module provides an at-a-glance view of power quality, with intuitive visual displays, statistically derived trending and indicators of overall power health. In addition it has an RJ-45 Ethernet port built right into the faceplate for easy and safe meter configuration.

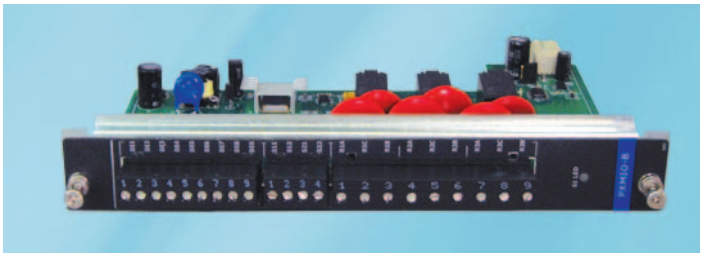
Communication expansion card

An optional communication expansion card supports remote communications with the onboard Web server application over your LAN/WAN, or the Internet via standard Ethernet 10/100Base-T and fiber-optic connection. Modbus is supported over TCP, RS-485 RTU and RS-232 ASCII ports.



I/O card

The Power Xpert Meter I/O Card is extremely flexible and can be used in a large variety of different applications. Digital inputs and relay outputs can be programmed to interact during various conditions defined by the user. Various third-party devices, such as alarm, pulse meters, trip units, sensors can be easily integrated to the Power Xpert Meter. Triggers and events can be easily tied into the meter's standard functions, such as e-mail, logs and trends.

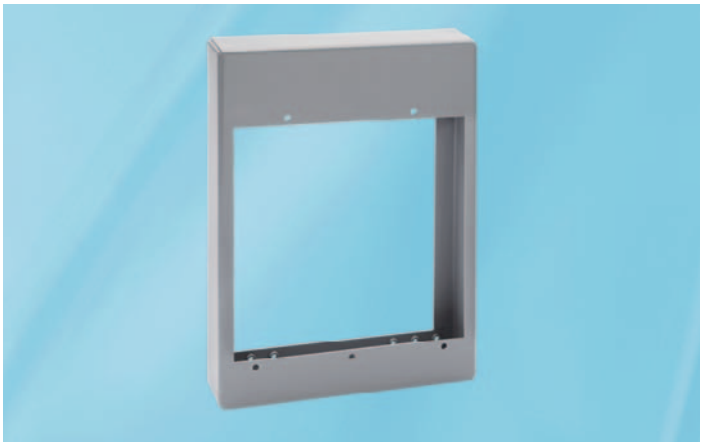


AUX voltage input channels

The optional Voltage Auxiliary (VAUX) option provides three voltage input channels (V6, V7, V8) in addition to the standard four channels already built in.

Mounting options

- Back-to-back mount
- IQ Analyzer retrofit mount
- Reduced LCD display mount



Power Xpert Meters 4000/6000/8000

Go green.

An Eaton Green Solution

Exceptional tools to help you visualize energy usage and go green

Environmental stewardship, innovation and leadership are becoming increasingly important as we take steps to create a sustainable environment for future generations by going green. The Power Xpert Meter includes components that can help a building go green and qualify for Leadership in Energy and Environmental Design (LEED®) credits through the U.S. Green Building Council (USGBC).

The Power Xpert Meter can meter and provide the backbone of load control, measurement and monitoring for on-site power sources. When applying renewable energy, every effort should be made to take advantage of net metering with the local utility.

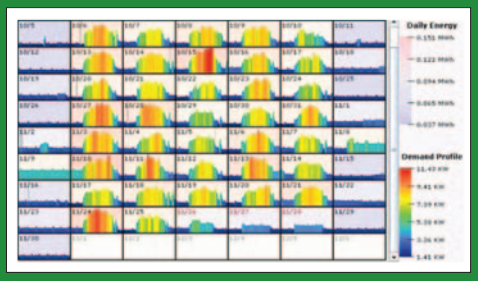
Establish an energy baseline

The Power Xpert Meter establishes a baseline of your energy usage. It allows you to easily compare month-to-month energy usage graphs. It will automatically store the energy data for exporting detailed analysis, for example, in Excel. Receive periodic e-mail alerts on energy consumption or triggered by thresholds you have set, to remind you and to help you achieve your savings goals.

the green grid℠ member

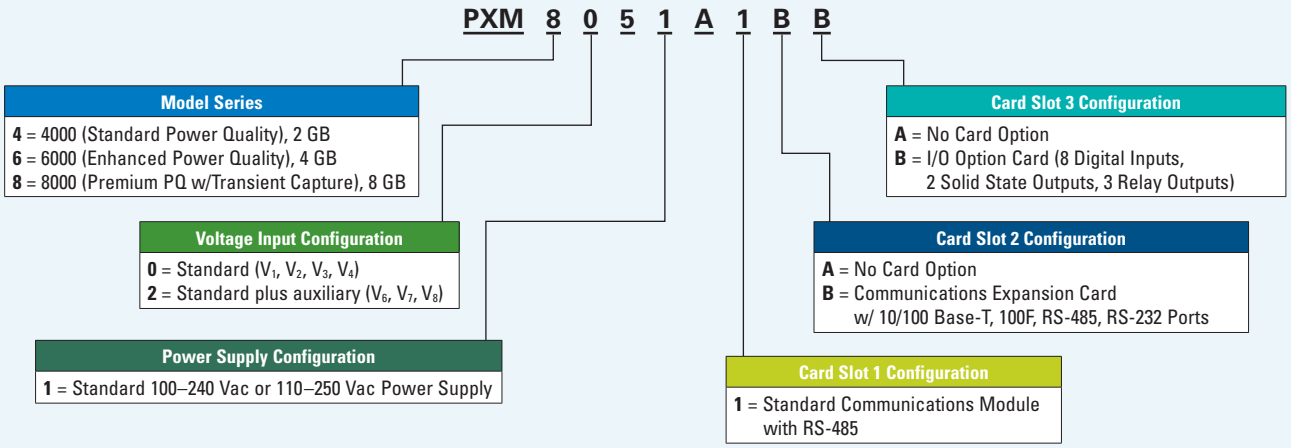
Compare expected energy usage and predict future usage levels

Eaton offers the Power Xpert Meter Profiler, which, in conjunction with the Power Xpert Meters, allows you to compare "expected" energy consumption patterns to present usage, and flag areas of concern using deviations from modeled energy patterns. These deviations point to targets as they hunt for energy consumption offenders in their facility. By applying pattern analysis techniques and intelligently using color and shape to convey the results, the Power Xpert Meter Profiler provides the user an easy-to-understand visualization of energy usage.



Power Xpert Meter Profiler's main screen
The tool is also a predictor. It can predict what energy consumption would be expected later in a day by comparing present consumption with historical averages and modifying the look-ahead predictions based on how closely the present consumption matches the predicted values.

Power Xpert Meter 4000/6000/8000 Catalog Numbering System


PXM 8 0 5 1 A 1 B B
Model Series
4 = 4000 (Standard Power Quality), 2 GB
6 = 6000 (Enhanced Power Quality), 4 GB
8 = 8000 (Premium PQ w/Transient Capture), 8 GB
Voltage Input Configuration
0 = Standard (V1, V2, V3, V4)
2 = Standard plus auxiliary (V6, V7, V8)
Power Supply Configuration
1 = Standard 100–240 Vac or 110–250 Vac Power Supply
Card Slot 3 Configuration
A = No Card Option
B = I/O Option Card (8 Digital Inputs, 2 Solid State Outputs, 3 Relay Outputs)
Card Slot 2 Configuration
A = No Card Option
B = Communications Expansion Card w/ 10/100 Base-T, 100F, RS-485, RS-232 Ports
Card Slot 1 Configuration
1 = Standard Communications Module with RS-485

Example 1: **PXM8251A1BB** (PXM 8000 Meter, w/ VAUX, Std pwr, Com. Exp. and I/O Cards)
Example 2: **PXM6251A1BA** (PXM 6000 Meter, w/ VAUX, Std pwr, Com. Exp. Card)

Power Xpert Meter 4000/6000/8000 Accessories

Description	Catalog Number
Graphic display module	**PXD-MMG**
Digital I/O card: 8 digital input, 2 solid-state output, 3 relay output	**PXMIO-B**
Communications expansion card: Ethernet 100FX, 10/100T, RS-485, RS-232	**PXMCE-B**
Panel mounting bracket assembly for back-to-back meter to graphic display mounting	**PX-PMBA**
Panel mounting bracket assembly for retrofitting a graphic display to an IQ analyzer cutout	**PX-PMBB**
Panel mounting bracket assembly required for reduced graphic display rear clearance	**PX-PMBC**
Power Xpert Meter 4000 to 6000 license upgrade key	**PXM-4KUPG**

Eaton Corporation
Electrical Sector
1111 Superior Ave.
Cleveland, OH 44114
United States
877-ETN-CARE (877-386-2273)
Eaton.com/pxm

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